FARM PRACTICES IN THE WEYBURN LOAM AND REGINA HEAVY CLAY SOILS OF SASKATCHEWAN

by

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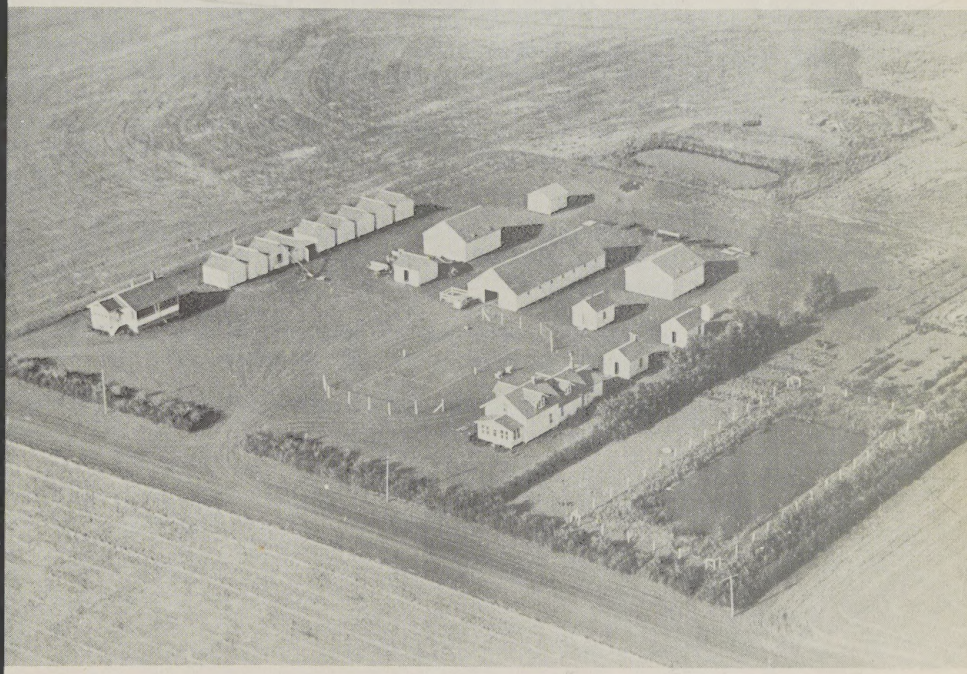

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ACKNOWLEDGMENT

This study is the second of a series of two Farm Practice studies conducted in Saskatchewan in 1950 and 1951. The report on the first survey, "Farm Practices in Central Saskatchewan", deals with features of farm management and organization and the 'what', 'when' and 'how' of farm practices which relate to farm success on light textured soils. This report deals with the same management factors in connection with medium and heavy textured soils of the prairie area. In many respects, it follows the pattern of the previous report.

The Department of Farm Management at the University of Saskatchewan, the Prairie Farm Rehabilitation Administration and the Economics Division were the co-operating agencies in this study. Professor H. Van Vliet aided greatly in the planning and development of the study and especially in the technical phases of the analysis. Personnel and financial assistance were provided by P.F.R.A.

A particular expression of appreciation is offered to the farmers who provided the basic data and municipal officials who gave generously of their advice and time during the course of the field work.

Acknowledgment is also extended to the Bank of Commerce for permission to use the illustrations from the series of "Commerce" booklets.

The cover picture is the farm of Mr. Earle E. Sanborn, Estlin, Saskatchewan.

FOREWORD

It has long been known that success in farming depends upon many factors. In economic terms success can be measured with relative accuracy. The "personal" factor, in all of its ramifications, is frequently of great importance but it practically defies measurement. The economist has to deal with the factors which can be measured or estimated with reasonable accuracy so that his results and conclusions are valid and can be applied with confidence.

The studies reported herein are part of a series which have been conducted in various parts of the province. The pattern followed has varied somewhat, depending upon local conditions, facilities available and accumulated experience. In each of these studies an attempt has been made to measure the effect of a number of factors upon the prospects for economic success for farmers in the area. It will be noted that the factors to which attention was given in this study cover a wide range. They include such things as the productivity of the land, size of farm and farm practices.

It is hoped that studies such as this will prove valuable to farmers in the area concerned when considering plans for the future. They should be particularly valuable to Municipal Councils, Agricultural Boards and Committees, Agricultural Representatives and everyone who is interested in the development of sound policies for the use of land.

For many years the Economics Division, Canada Department of Agriculture and the Farm Management Department of University of Saskatchewan have co-operated in studies on the economic phases of farming in this province. This publication is an excellent example of the results which can be achieved by such co-operative effort.

I hope that it will be studied carefully and that it will contribute materially to the development of sound policies for the best use of our land resources.

V.E. Graham
Dean of Agriculture
University of Saskatchewan.

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THERE IS NO END TO WHAT HAS TO BE LEARNED TO PRODUCE LOW-COST, HIGH QUALITY FOOD.

SUMMARY AND CONCLUSIONS

The best and most prosperous farmers long ago proved the wisdom of employing those farm practices that tend to produce the best production results. Present day farmers are also aware that some farm practices will vary from locality to locality and even from farm to farm depending on the prevailing soil and climatic conditions. Consequently, farmers are constantly attempting to improve and modify their farm practices.

It is not a simple matter, however, to select those farm practices that tend to produce the best results. For this reason farmers are always seeking information from sources other than the common trial and error method of selecting farm practices. This study is an attempt to assess those farm practices that tend to influence the productive capacity of the farms on Regina heavy clay and Weyburn loam soils.

There were wide differences in wheat yields between farms in both the heavy clay soils area and the loam soils area. Assuming that the soil and climatic conditions were constant for all farms in each area, then the discrepancies in yields were due mainly to differences in farm practices. Thus, all farm practices were examined for their relationship with yields on the basis of the general assumption that all other variable factors within each area were constant.

The practices that appeared to be significantly related to yields in 1950 and 1951 were (1) pre-seeding cultivation, (2) type of implement used for seeding, (3) depth of seeding, (4) use of fertilizer, (5) use of weed spray, (6) number of summerfallow operations and (7) type of implement used for summerfallow operations. There was further evidence to indicate that higher yields were not the result of the application of any one of the above practices but rather the result of the use of a combination of these practices.

There were more farmers in the high yielding groups who had cultivated the land before seeding than farmers with no pre-seeding cultivation. Nearly all the farmers who had employed a pre-seeding cultivation had also used the drill rather than the discer or one-way for seeding. It was impossible to ascertain which of the two interrelated practices was more closely associated with yields.

Depth of seeding was one of the farm practices that farmers tended to adjust to the moisture conditions of the soil. The farmers on clay soils where the surface soil moisture conditions were satisfactory found that shallow seeding produced higher yields. On the other hand, the farmers on loam soils that sowed deep in order to get the seed to moisture had the best results.

The comparative analysis of the low yielding and high yielding farms showed that commercial fertilizer was used on a larger proportion of the high yielding farms. In addition, it was noted that more farmers

on the clay soils favoured the use of fertilizer than those on the loam soils.

Another significant factor that emerged from this study was that the farmers on high yielding farms were more aware of the value of controlling weed growth through the use of weed spray. Also, where weed spray was used with other proven weed control measures, it enabled farmers to substantially reduce the heavy annual losses that weeds would have caused.

With regard to summerfallowing practices, it was noticed that a larger number of farmers who had high yields had employed three or more operations on summerfallow. Also, the farmers on high yielding farms used the cultivator type of implement to a greater extent and the disc type of implement to a lesser extent than the farmers on the low yielding farms. The more successful farmers employed a combination of disc and cultivator type of implement at least three times during the summerfallow year.

Further study was undertaken to examine the number of the above-mentioned practices carried out on each high yielding and low yielding farm. The results showed that the majority of farms that carried out none or only one to three of these practices fell in the low yielding group. On the other hand, those farms with four or more of these practices were more commonly found to fall in the high yielding group. Thus, high yields were not the result of the application of any one selected practice but rather the combined effect of the application of a number of selected practices.

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M. Ragush 1/ and F.F. Cline 2/

INTRODUCTION

Many farmers cannot understand why their neighbours have better results in farm production. They usually attribute the production difference to a number of physical factors. The most obvious reason for the differences in production, they say, is that the neighbours' farms are on heavier textured land. Others may comment on the extra amount of rainfall that the neighbours have had. A few observe the neighbours' methods of production and attribute their success to better farming. No doubt these and many other factors influence farm production.

The differences in the productive output of the farms arising from physical factors such as climate and soil are largely beyond the control of the farmers. However, managerial skill as revealed in farm practices may be altered in a manner that will enable the farmers to get the most out of the resources at their disposal. This study is concerned primarily with assessing those features of farm organization and farm practices which tend to influence the productive capacity of the farms on Regina heavy clay and Weyburn loam soils.

The specific purposes of the study may be outlined as follows:

(1) To study and compare the patterns of land use on Regina heavy clay and Weyburn loam soils.

(2) To study and compare the farm practices on Regina heavy clay and Weyburn loam soils.

(3) To study and compare the relationship between farm practices and farm production on Regina heavy clay and Weyburn loam soils.

The field survey consisted of the enumeration of a specially prepared questionnaire from a sample of farm operators during the summer of 1951. A total of 328 farm practices records were obtained, Of these, 167 records were from farmers on Regina heavy clay soil and 161 records from farmers on Weyburn loam soil.

The recorded data included information on land use, cultural

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practices, moisture conservation practices, soil management practices, control of hazards and crop yields. Detailed information was obtained on cultural practices for the 1950 and 1951 summerfallow crops, 1951 stubble crop, and 1950 summerfallow. The municipal officials in the area supplied most of the information on ownership, occupancy and tenure.

Characteristics of the Study Area

The study area consisted of two main sections, each based on a predominant soil association. The Weyburn loam area, referred to as the loam area or group for the purposes of this report, borders the eastern part of the heavy clay soils of the Regina Plains. The Weyburn loam is made up of parts of the Rural Municipalities of Golden West No. 95, Fillmore No. 96, Chester No. 125 and the major portions of Montmartre No. 126 and Francis No.127. The heavy clay area takes in all or portions of the following rural municipalities; Scott No. 98, Caledonia No. 99, Lajord No. 128 and Bratt's Lake No. 129.

Soil.- The survey areas of both soil associations fall within the Dark Brown soil zone. The Weyburn association is the main soil association in the loam group. All records for the loam area were obtained on farms predominantly of the Weyburn loam soils. The heavy clay area is made up entirely of the Regina heavy clay soils.

Topography.- The loam area has a "wavy relief consisting of a succession of knolls, intermediate slopes and depressions".1/ This description of the Weyburn soil association aptly describes the undulating topography of the loam area.

The topography of the heavy clay area is summed up by the following quotation, "Over 90 per cent of the Regina soils are mapped in undulating phases, and the bulk of this land is very gently undulating (nearly level)".1/ The heavy clay area is characterized by the open nature and flatness of the landscape.

The nature of the topography of each area has a considerable influence on the type of farming and the type of farm practices carried on in each area. The loam area is rougher and far too many stones are found, which tends to slow down field operations. Farmers in the heavy clay area tend to have larger fields and larger and faster moving machines than farmers in the loam area. The nature of the topography in the clay area allows this difference.

Land Classification of the Area.-2/ The land classification is based on the estimated productivity of quarter sections of land in terms of

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1/ Mitchell, J., et al, Soil Survey Report No. 12, p. 80, University of Saskatchewan, Saskatoon, June 1944.

2/ J. Zeman, Economist, Economics Division, Canada Department of Agriculture, University of Saskatchewan, Saskatoon, was in charge of the land classification project.

AN ECONOMIC CLASSIFICATION OF LAND

Weyburn Loam Soils Area

M. POPLACK - 22 April 1953.

wheat production. The classification 1/ was made by the use of long-time average wheat yields for various soil groups by the use of land pattern maps and aerial photographs which provided data on arable acreage, topography and other factors. The long-time average yields were based on estimates of past performances obtained from the farmers in the area. Land pattern maps were made up from assessment plats and from aerial photographs.

Each quarter section is given a productivity rating and placed in one of the five land classes. Land Class I is submarginal for wheat production. The long-time yields on Class I, under average conditions, would not pay current operating and living expenses on rent free land. Land Class II, under average conditions, is expected to pay farm expenses (including depreciation and taxes), provide a living for the operator and his family but not yield an income sufficient to pay for the use of the land either as rent or interest. Land Classes III, IV and V are considered to be above the margin for successful wheat production, the high numerals indicating better grades of land.

The four municipalities representing the Regina heavy clay soil area comprise 845,880 acres. Of the total, 14.7 per cent was rated as Land Class I, 6.8 per cent as Land Class II, 4.8 per cent as Land Class III, 8.5 per cent as Land Class IV and 65.2 per cent as Land Class V.

The Weyburn loam soil area comprises five municipalities totalling 1,096,897 acres. Of the total acreage, 20.7 per cent was rated as Land Class I, 46.9 per cent as Land Class II, 28.1 per cent as Land Class III, 3.2 per cent as Land Class IV and 1.1 per cent as Land Class V.

A comparison of these two areas showed that the productivity rating of the land in the Regina heavy clay soil area is considerably higher than that in the Weyburn loam soil area. In the Regina heavy clay area, 78.5 per cent of the land was rated as suitable for wheat production (Land Classes III, IV and V), whereas in the Weyburn loam area only 32.4 per cent was in this category.

The amount of land occurring in each land class within municipalities and areas is shown in Table 1 and in Figures 1 and 2.

1/ See "An Economic Classification of Land in Fifty-Six Municipal Divisions, South Central Saskatchewan." C.C. Spence and E.C. Hope. Technical Bulletin No. 36, 1941, for a full explanation of the procedure for classifying land.

Table 1.- Acreage and Percentage of Total Land Area in Each Land Class by Municipal Unit, Farm Practices Survey Area, 1951

Municipal Unit	No.	Total acres	Land class I	II	III	IV	V
			- percentage of total area -				
Regina heavy clay area							
Scott	98	204,712	7.5	4.3	5.3	9.1	73.7
Caledonia	99	205,920	44.8	15.7	7.6	9.1	22.8
Lajord	128	228,791	6.1	6.0	6.1	14.4	67.4
Bratt's Lake	129	206,457	1.3	1.2	0.2	0.9	96.4
Total		845,880	14.7	6.8	4.8	8.5	65.2
Weyburn Loam area							
Golden West	95	204,191	29.6	25.7	44.7	-	-
Fillmore	96	205,886	14.8	54.1	24.4	6.7	-
Chester	125	204,759	20.2	62.3	17.4	-	-
Montmartre	126	209,287	23.7	52.8	23.5	-	-
Francis	127	272,774	16.6	41.3	30.1	7.7	4.3
Total		1,096,897	20.7	46.9	28.1	3.2	1.1

Land Ownership

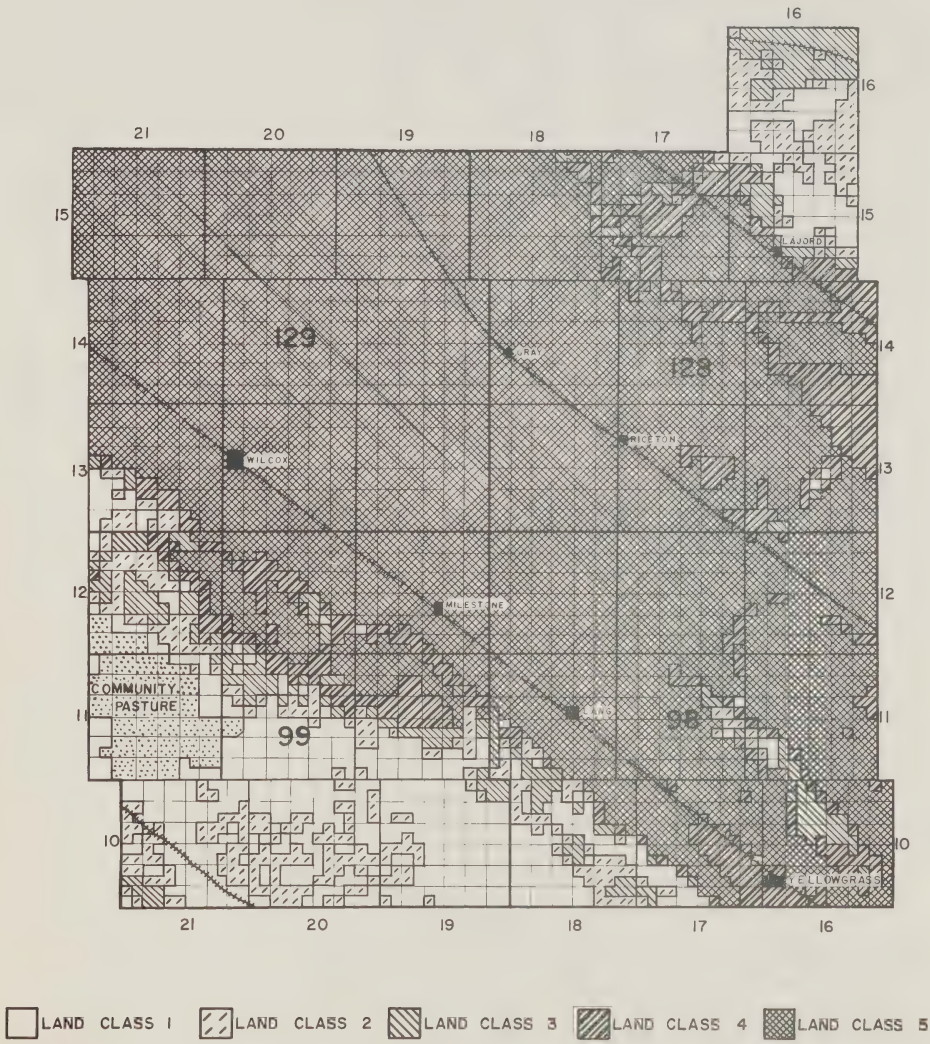
The land ownership patterns of the two areas were surprisingly similar. About 90 per cent of the land in each area was individually owned. The remainder was under public and corporate ownership. Any variation in ownership between the two areas was within a range of one to six per cent.

Table 2.- Land Ownership, All Quarter Sections in the Farm Practices Survey Area, 1951

Ownership	Loam soil area	Clay soil area
	- per cent of quarter sections -	
Private Individuals	90.0	91.0
Local residents	81.0	77.0
Canadian residents	8.0	7.0
Foreign residents	1.0	7.0
Companies	2.0	1.0
Crown and rural municipalities	3.7	1.0
Townsites	0.2	0.2
Estates	4.0	6.7
Other	0.1	0.1
Total	100.0	100.0
Number of quarter sections	4,500	4,032

AN ECONOMIC CLASSIFICATION OF LAND

Regina Heavy Clay Soils Area



LAND CLASS 1 | LAND CLASS 2 | LAND CLASS 3 | LAND CLASS 4 | LAND CLASS 5

M. POPLACK - 22 April, 1953.

Farm Tenure

The data on farm tenure presented in Table 2 refer to the occupancy of all farms in the townships from which the sample groups were obtained. There were 1,297 farms in these townships. Of the total, 530 farms were in the loam soil area and 767 farms in the clay soil area.

Table 3.- Farm Tenure, All Farms in the Farm Practices Study Area, 1951

Tenure	Loam soil area	Clay soil area
	- per cent of farms -	
Fully owned	55	50
Partly owned	27	26
Fully rented	18	24
Number of farms	530	767

The loam area had a slightly higher percentage of fully owned farms and a lower number of fully rented farms. The distribution of partly owned farms was the same in each group.

Farm Size

All farms in the survey area are included in the distribution of farm sizes. There were 1,297 farms in the townships from which the farm practices records were taken. The distribution of farms by number of quarters in farm unit is shown in Table 4.

Table 4.- Farm Size, All Farms in the Farm Practices Survey Area, 1951

No. of quarter sections in farm unit	Loam soil area	Clay soil area
1	3	2
2	21	23
3	22	14
4	21	16
5	13	10
6	8	9
7	3	3
8	3	4
9 and over	6	9
Number of farms	530	767

The majority of farms in each area belonged to the two to five quarter section groups. Apart from the tendency towards larger farms in

the clay area, the distribution of farms in terms of the number of quarter sections per farm was the same in each group.

Land Utilization

The average farm size for the loam area was 605 acres as compared with 783 acres for farms in the clay area. Of this acreage, 76 per cent was improved on the farms on loam soils and 99 per cent on the farms on the clay soils. The unimproved acreage on the loam soil farms was predominantly grazing land unsuitable for cultivation.

Table 5.- Land Utilization for Farms in the Farm Practices Survey Area, 1951

Utilization of land	Farms on loam soils (161)	Farms on clay soils (167)	All farms (328)
	- average acreage per farm -		
Total size	605	783	697
Total improved	460	776	621
Wheat on summerfallow	152	262	208
Wheat on stubble	53	200	128
Oats on summerfallow	7	3	5
Oats on stubble	66	11	38
Barley on summerfallow	1	1	1
Barley on stubble	14	7	16
Other crops	9	6	7
Summerfallow	151	266	209
Farmstead	7	10	9
Total unimproved	145	7	76
Native pasture and unused land	138	5	71
Leased grazing	7	2	5

Wheat was the main crop in both areas. The farms on loam soil devoted 45 per cent of the improved land to the growing of wheat. Of the total improved acreage on the farms in the clay soil area, 60 per cent was in wheat. The average acreage of oats per farm was 73 acres in the loam area which was about five times the acreage per farm for the clay area. Barley was not an important crop for either group of farms. Wheat was considered the best cash crop and, therefore, neither oats nor barley was grown to any great extent on summerfallow.

Livestock

Livestock numbers were generally higher on the loam than the clay farms, especially in the case of cattle. This is illustrated in Table 6.

A superior type of farmstead on Weyburn loam soils.

An inferior type of farmstead on Weyburn loam soils.

Table 6.- Livestock Numbers, Farms in the Farm Practices Survey Area, 1951

Livestock	Farms on loam soil	Farms on clay soil
	- number per farm -	
Horses	3.8	0.7
Cattle	15.5	3.2
Hogs	4.9	2.5
Poultry	96.3	95.9

There were not many horses in either area. In the loam area there were about five times as many horses per farm than in the clay area. Cattle and hog numbers were also higher on the average on the loam farms. Poultry numbers were about the same for both groups of farms.

Horses.- Horses were of minor importance on the farms in the survey area. None of the farmers interviewed used horses for field work. The horses were used for odd jobs around the farm and for winter transportation.

Table 7.- Horse Numbers, Farms in the Farm Practices Survey Area, 1951

Number of horses	Farms on loam soil	Farms on clay soil
	- per cent of farms -	
No. horses	9	61
1 to 2	24	34
3 to 4	34	4
5 to 6	23	1
Over 6	10	0

The proportion of farms with no horses on loam soils was nine per cent as compared with 61 per cent on the clay soils. Of those farms having horses, the largest percentage of farms in the loam group had from one to six horses per farm, whereas the clay farms had only one to two horses.

Cattle.- Cattle numbers were considerably higher on the loam than on the clay farms, largely because of the larger acreage of unimproved land available for grazing in the loam area. The farms on loam soil averaged 145 acres of unimproved land per farm compared with only seven acres on the clay soil farms.

As many as 77 of the 167 farmers interviewed in the clay soils area had no cattle. In the loam soils area only 19 of the 161 farms visited had no cattle. Of those farms with cattle, most of those on loam soils had from six to 30 head as compared with only one to five

head on the clay soils.

Table 8.- Cattle Numbers, Farms in the Farm Practices Survey Area, 1951

Number of cattle	Farms on loam soil	Farms on clay soil
	- per cent of farms -	
No cattle	12	46
1 to 5	11	37
6 to 10	21	8
11 to 20	25	6
21 to 30	22	3
Over 30	9	0

Hogs.- Hogs were kept by a greater percentage of farmers in the loam than in the clay area. For example, 77 per cent of the farms in the loam area had hogs compared with 32 per cent in the clay area.

Table 9.- Hog Numbers, Farms in the Farm Practices Survey Area, 1951

Number of hogs	Farms on loam soil	Farms on clay soil
	- per cent of farms -	
No hogs	23	68
1 to 3	25	12
4 to 10	40	12
11 to 20	10	6
21 and over	2	2

The largest percentage of farms in the loam area kept from four to ten hogs which was about one litter. Hogs were not generally important as a class of livestock in the survey area.

CULTURAL PRACTICES

Information on the different practices associated with farming on the Regina heavy clay and Weyburn loam farms was obtained in the survey. It concerns the manner in which the practices were carried out on the 1950 and 1951 summerfallow crops, 1951 stubble crop and 1950 summerfallow.

This information includes what the practices were and how and when they were carried out. The 'what' of the farm practices refers to the different practices which were associated with farming in each area. Such things as the kind of implements used in seeding and summerfallowing as well as the depth and speed of the operations indicate the 'how' of farm practices. The 'when' of practices relates to the time the operations were carried out.

Pre-seeding Cultivation

Seeding operations on summerfallow are accomplished either by preparing the seed bed and sowing the grain in one operation or by preparing

Good farm buildings and large grain storage facilities are common in the Regina heavy clay soils area.

Dug-outs are the only source of water supply on a number of farms in the Regina heavy clay soils area.

the seed bed with a cultivator, one-way or discer and then sowing the grain separately with a drill. Farmers pointed out a number of advantages and disadvantages for each method. Some of the farmers mentioned that by preparing the seed bed and sowing the grain in one operation they were able to complete the seeding operation early and at low cost. Other farmers maintained that the use of the drill after a pre-seeding operation resulted in good seed bed, proper control in depth of seeding and better weed control. The relative merits of the two methods in relation to yields will be discussed in a later section.

It was noticed that more farmers on loam soils did pre-seeding cultivation than farmers on the clay soils. Of those farmers who practised pre-seeding cultivation on summerfallow, the cultivator type of implement was more commonly used in the loam group and the disc type was favoured in the clay group. In the case of stubble cropland, the disc type of operation was common for both groups.

Table 10.- Characteristics of Pre-seeding Cultivation for Farms in the Farm Practices Survey Area, 1951

	Summerfallow crop 1951		First stubble crop 1951		Summerfallow crop 1950	
	Loam	Clay	Loam	Clay	Loam	Clay
	- per cent of all farms -					
With pre-seeding cultivation	66	22	30	13	67	17
Kind of implement	- per cent of farms with pre-seeding cultivation -					
Disc type	31	73	87	100	33	82
Cultivator type	66	18	10	-	64	18
Other	3	9	3	-	3	-
Time of completion						
Before May 15	79	77	40	54	52	18
May 15 and after	21	23	60	46	48	82
Depth of operation						
Under 4"	88	100	87	100	94	100
4" and over	12	-	13	-	6	-
Speed of operation						
Up to 3.5 m.p.h.	26	5	23	8	24	6
3.6 to 4.5 m.p.h.	59	59	63	69	61	65
Over 4.5 m.p.h.	15	36	14	23	15	29

There were some differences in the time of completion of the pre-seeding operation as between groups. Farmers on loam soils tended to complete the pre-seeding operation a little earlier.

The farmers in both areas worked the land fairly shallow before seeding. All the farmers in the clay soil group cultivated the land less than

four inches deep and only the odd farmer in the loam group went deeper than four inches.

More farmers in the loam soil group were aware of the tendency of the soil to be pulverized at the higher rates of speed of operation. It is likely that the damaging effect of soil drifting on the loam soils is greater than on the clay soils because of the shallower top soil layer and consequently these farmers were more conscious of the speed at which they operated.

Seeding Operation

There were wide differences in the kind of implement used for seeding in the two groups of farms. About 64 per cent of the farmers on loam soils favoured the drill for seeding on summerfallow whereas over 80 per cent of the farmers on clay soils used the one-way and discer. In seeding stubble cropland the one-way and discer were used extensively in both areas. On those farms where the one-way and discer were used for seeding, the discer was favoured on the clay soils and the one-way on loam soils.

Table 11.- Characteristics of the Seeding Operation for Farms in the Farm Practices Survey Area, 1951

	Summerfallow Crop 1951		First Stubble Crop 1951		Summerfallow Crop 1950	
	Loam	Clay	Loam	Clay	Loam	Clay
	- per cent of farms -					
Kind of implement						
Drill	64	19	31	14	64	20
One-way	28	31	60	38	31	38
Discer	8	51	9	48	5	42
Time of completion						
May 11 and earlier	24	24	12	16	19	3
May 12 to 17	54	49	23	34	37	20
After May 17	22	27	65	50 a/	44	77
Depth of operation						
Up to 2" deep	38	18	27	16	18	11
2.1" to 3.5" deep	59	76	64	76	75	79
Over 3.5" deep	3	6	9	8	7	10
Speed of operation						
Up to 3.5 m.p.h.	23	6	23	6	24	6
3.6 to 4.5 m.p.h.	60	57	62	51	60	56
Over 4.5 m.p.h.	17	37	15	43	16	38
Rate of seeding						
Under 1.5 bu. per acre	23	7	23	16	24	5
1.5 bu. per acre	76	91	76	82	70	52
Over 1.5 bu. per acre	1	2	1	2	6	43

a/ The three time periods for stubble crop are: May 12 and earlier, May 13 to 18 and after May 18.

A homemade discer with seeding attachment.

A barn cut down and converted
to a machine shed.

In the main, the distribution of farms as to the time of completion of seeding was about the same for the two groups. Only in the case of "summerfallow crop 1950" was there any substantial indication of differences. The farmers in the loam group for that year finished seeding earlier than the farms in the clay group.

The depth of seeding for the majority of farms in both groups was 2.1 to 3.5 inches.

The speed of operation for the largest percentage of the farms in the two groups was 3.6 to 4.5 miles per hour. There were, however, some farmers in the loam soil group who operated at speeds below 3.5 miles per hour.

The most common rate of seeding wheat in the areas was 1.5 bushels per acre. The farmers on loam soils tended to sow at a lighter rate. It was noticed that 43 per cent of the farmers in the clay group on "summerfallow crop 1950" sowed over 1.5 bushels per acre. This was in accordance with the recommendations of higher rates of seeding resulting from the use of frost-damaged seed grain.

After Seeding Cultivation

It was considered a good practice to level and pack the land after seeding. The farmers mentioned that a seeding operation followed by a packer or harrow resulted in faster and more even germination of seed, conserved moisture, and in the case of use of harrows helped eradicate small weeds. They also pointed out that care was needed in employing an after seeding cultivation since the harrow and packer tended to pulverize the soil surface making the land susceptible to wind erosion. The danger of wind erosion, however, was lessened where there was some trash cover on the soil surface.

The characteristics of the after seeding cultivation on 1950 and 1951 summerfallow crops and 1951 first stubble crop for farms on Weyburn loam and Regina heavy clay soils are illustrated in Table 12.

Nearly all the farmers in the two areas did some kind of after seeding cultivation. The largest percentage of farmers preferred the use of the harrow rather than the packer as an after seeding implement. The majority of the farmers also favoured the practice of keeping the seeding and after seeding operations separate. The alternative method was to combine the seeding and the after seeding operations.

Judging from the large number of farmers operating at speeds of 4.5 miles per hour and over in the two areas, it appeared that the farmers were not aware of the wind erosion hazard resulting from high speeds of operation. Perhaps the time saved through speedier operations, at least during the years of minimum soil drifting tendency, was considered to be of greater value to productive output. The higher speeds were more evident on the farms on clay soils.

Table 12.- Characteristics of After Seeding Cultivation for Farms in the Farm Practices Survey Area, 1951

	Summerfallow Crop 1951		First Stubble Crop 1951		Summerfallow 1950	
	Loam	Clay	Loam	Clay	Loam	Clay
	- per cent of farms -					
With after seeding cultivation	92	98	88	89	90	97
Kind of implement	- per cent of farms with after seeding cultivation -					
Harrow once or twice	87	82	78	81	96	89
Pack	11	4	18	4	2	1
Pack and harrow	2	14	4	15	2	10
Use of implement						
Used with seeder	13	3	14	2	9	1
Used separately	87	97	86	98	91	99
Speed of operation						
Up to 3.5 m.p.h.	12	2	10	3	14	2
3.6 to 4.5 m.p.h.	44	23	42	19	40	22
Over 4.5 m.p.h.	44	75	48	78	46	76

Quality of Seed

The criteria used to determine the quality of wheat seed used in the area was based on: (1) the use of registered first, second or third generation seed, (2) the use of seed with a high per cent germination, and (3) the use of smut-free seed. The farmers in the survey area were questioned on the generation of seed used, on germination tests, and on smut treatment of seed.

Only high quality seed was used by the majority of farmers in the two areas. The farmers on the clay soils were more aware of the importance of the use of good quality seed.

It was noticed that the use of good quality wheat seed was more extensive in 1950 than in 1951. This was particularly evident with regard to the generation of seed used. In 1950, the majority of farmers used registered first, second or third generation seed. In 1951, however, the largest percentage of the farmers used seed that was more than three years old. The use of the old seed in 1951 was probably due to the severe frost damage to grain in 1950 which forced many farmers to use seed held over from previous years.

Maintenance of Fertility and Organic Matter

Only a small proportion of the farmers in the survey area attempted to improve and maintain the fertility and organic matter of the soil.

FOR EXAMPLE - IF LOW IN SOIL FERTILITY,

BARNYARD MANURE, COMMERCIAL FERTILIZER, GREEN MANURE, LEGUMES AND FORAGE CROPS ALL HELP TO IMPROVE THE SOIL.

Thirty-six per cent of the farmers in the loam soil area and four per cent of those in the clay soil area indicated that the available barnyard manure was spread on the land. About ten and 30 per cent of the farmers on the loam and clay soils, respectively, used commercial fertilizer. Of the 328 farmers interviewed, only seven had used green manure for fertilizing purposes. Again, only four farmers reported the use of grasses or legumes for maintaining soil fertility and organic matter.

Use of Chemicals for Weed Control

The use of weed spray to control weeds was an important practice in the survey area. It was demonstrated by the majority of farmers that chemicals are of tremendous value for fighting weeds. Table 13 indicates the extensive use of weed spray on farms on the loam and clay soils.

Table 13.- Use of Weed Spray for Farms in the Farm Practices Survey Area, 1951

	Farms on loam soil	Farms on clay soil
	- per cent of farms using weed spray -	
1950 summerfallow crop	44	75
1951 summerfallow crop	11	52
1951 stubble crop	70	43

There were significant differences between the two groups of farms in the number of farmers using chemicals. The percentage of farmers reporting crop treatment was generally higher for the clay soil group. The farmers on the loam soils placed more emphasis on controlling weeds on stubble crop in 1951, whereas the farmers on clay soils were more concerned with keeping the summerfallow crop clean from weeds.

It was emphasized by the farmers interviewed that no single treatment or chemical can replace good, sound farming practices. The fact that weed spray is selective in its action makes it valuable for destroying susceptible weeds in growing crops, but it also suggests limitations in the use of this chemical as a substitute for tillage in the control of weeds in general. Where weed spray was used with other proven weed control measures, it enabled farmers to reduce substantially the heavy annual losses that weeds would have caused.

Harvesting Methods

Swathing and combining was the most common method of harvesting for both groups of farms. On the farms on loam soils, where straw was needed for fodder, cutting and threshing was still fairly common. Table 14 indicates the percentage of farmers who used the various methods of harvesting.

Table 14.- Harvesting Methods Used on Farms in the Farm Practices Survey Area, 1951

Method	Summerfallow crop 1951		First stubble crop 1951		Summerfallow crop 1950	
	Loam	Clay	Loam	Clay	Loam	Clay
	- per cent of farmers -					
Swathing and combining	67	99	57	98	63	99
Straight combining	9	-	12	2	9	1
Threshing	24	1	31	-	28	-

Fallow Tillage Before Summerfallow

Of the 328 farmers interviewed, only about 25 per cent had done fall tillage previous to the 1950 summerfallow year. All the farmers who did fall tillage used the discer, one-way or disc harrow. The fall tillage operation was completed during the period from October 1 to 15, 1949, on most of the farms. There was a wide range in the depth of operations but it appeared that a depth of 3.1 inches to 4.0 inches was most favourable. An intermediate speed of 3.6 to 4.5 miles per hour was the most common speed of operation.

There were no substantial differences between the loam soils and the clay soils groups in the number of farmers that did fall tillage or the manner in which the operation was carried out.

Summerfallow Tillage Operations

Detailed information was obtained in the survey on the tillage operations carried out during the spring, summer and fall months of the 1950 summerfallow year. The kind and number of tillage operations carried out will be discussed in this section. The number of tillage operations is shown in Table 15, the characteristics of the first and second summerfallow operations in Table 16 and the kind of implement used in all the tillage operations in Table 17.

Table 15.- Number of Tillage Operations on Summerfallow for Farms in Farm Practices Survey Area, 1951

Number of Operations	Farms on loam soil	Farms on clay soil
	- per cent of farms -	
1	1	2
2	15	29
3	42	60
4	29	8
5 and over	13	1

Over-abundant trash cover on a field in the Regina heavy clay soils area.

Lack of trash cover and stoniness on a field in the Weyburn loam soils area.

Table 16.- Characteristics of First and Second Summerfallow Tillage Operations for Farms in the Farm Practices Survey Area, 1951

	First tillage operations		Second tillage operations	
	Farms on loam soil	Farms on clay soil	Farms on loam soil	Farms on clay soil
	- per cent of farms -			
Kind of implement				
Disc type a/	68	89	60	43
Cultivator type b/	22	11	37	57
Other c/	10	-	3	-
Depth of operation				
3 inches and under	17	32	13	20
3.1 inches to 4 inches	46	46	47	32
Over 4 inches	37	22	40	48
Speed of operation				
Up to 3.5 m.p.h.	26	13	25	19
3.6 to 4.5 m.p.h.	61	59	64	59
Over 4.5 m.p.h.	13	28	11	22

a/ Includes one-way, discer and disc harrow.
b/ Includes heavy duty cultivator, duck foot cultivator and spring tooth cultivator.
c/ Includes rod weeder, harrow and float.

One hundred and sixty-six out of 328 farmers interviewed carried out three tillage operations on summerfallow. On the average, the farmers on loam soils tended to work the land more often than those on clay soils. For instance, 44 per cent of the farmers on loam soil had four or more tillage operations on summerfallow as compared with nine per cent on the clay soils.

Operations with the harrow were excluded from the above comparisons. It was noted, however, that the largest proportion of the farmers in both groups had made some use of the harrows during the summerfallow year.

The use of the one-way discer and the disc harrow for the first summerfallow operation was predominant in both groups of farms. The farmers on loam soils also favoured the use of the disc type of implement for the second operation. The majority of farmers on clay soils, however, preferred the use of the cultivator type of implement in working the land the second time over.

There were no substantial differences between the two groups of farms in the depth of cultivation. The farmers generally preferred shallow cultivation for the first tillage operation and deeper cultivation the second time over.

Table 17.- Implement Used for All Summerfallow Operations for Farms in the Farm Practices Survey Area, 1951

Implement used	Farms on loam soil	Farms on clay soil
	- per cent of farms -	
All disc type a/	21	16
All cultivator type b/	9	3
All disc type (last operation with cultivator type)	14	22
All cultivator type (first operation with disc type)	29	38
All disc type (first operation with cultivator type)	4	4
All cultivator type (first and last operation with disc type)	8	13
Other c/	15	4

a/ Includes one-way discer and disc harrow.
b/ Includes heavy duty cultivator, duck foot cultivator and spring tooth cultivator.
c/ Includes rod weeder, harrow and float.

The distribution of farms in terms of the speed of the tillage operations on summerfallow was similar to the pre-seeding and seeding operations mentioned previously. The farmers in both groups favoured the intermediate range of 3.6 to 4.5 miles per hour. Also, the farmers on clay soils tended to operate at higher speeds.

The majority of farmers in the two soil groups were aware of the importance of early summerfallow in controlling the weed growth and conserving moisture. Over 85 per cent of the farmers had completed the first operation before June 15 and nearly 75 per cent had completed the second operation before July 7. The first two tillage operations were completed somewhat earlier by the farmers in the clay soils group.

As mentioned previously, the first tillage operation on summerfallow involved the use of the disc type of implement by most of the farmers in the loam and clay soils areas. The information on the second summerfallow operation, however, showed a definite shift to the cultivator type of implement especially in the case of the farms on clay soils. The remaining summerfallow operations were carried out mainly by the cultivator type of implement.

Those farmers who preferred to leave the surface of the land smooth over winter usually levelled the cultivator ridges with a harrow or used a disc type implement instead of a cultivator as the last tillage operation in the fall. One-half the farmers interviewed preferred to leave the land surface in a smooth condition. The remaining half maintained that a ridged surface tended to hold the spring run-off moisture and thus favoured the use of the cultivator for the last operation in fall.

The enquiry into the reasons for summerfallowing revealed some interesting relationships between the number of operations carried out and the

Drainage problem in the Regina heavy clay soils area. Portion of the fields in the foreground dried too late to be sown.

Rough and stony pasture in the Weyburn loam soils area unsuitable for cultivation.

reasons for summerfallowing. The farmers whose main reason for summerfallowing was to conserve moisture had fewer operations. They pointed out that frequent tillage operations resulted in loss of moisture through evaporation down to the depth of cultivation. On the other hand, the farmers whose main concern in summerfallowing was to control weeds had more operations during the summerfallow year. The farmers maintained that moisture can be conserved only where weed growth was at a minimum. Other farmers used the extent of weed growth as a guide to the number of operations to be carried out. These farmers cultivated the land only when they felt that the growth of weeds was such that the loss of moisture due to weeds was greater than the amount of moisture lost through an additional operation.

Soil Management Practices

Wind Erosion.- Only a small proportion of the farmers in the survey areas reported soil drifting for the years 1950 and 1951. In 1950, 16 per cent of the farmers on loam soils and 22 per cent of those on clay soils had soil drifting. The soil drifting hazard in 1951 was slightly higher. The percentage of farms affected by soil erosion in 1951 was 17 per cent on loam soils and 29 per cent on clay soils. The above figures indicate that the number of farms with soil drifting was larger on the clay than on the loam soils.

No serious damage was reported from wind erosion. Most of the soil drifting was in the form of a slight movement of the top soil. Only 24 out of 328 farms visited indicated moderate to heavy soil surface removal.

Lack of trash cover was the most common reason for soil drifting. This factor was mentioned more often by farmers on the clay soils where trash cover was expected to be abundant. The fact that more farmers on clay soils burned stubble accounted for the lack of trash cover. Other less important reasons were too many summerfallow operations, extensive use of one-way, discer or disc harrow, and pulverization of the soil surface by a heavy downpour of rain in the early part of the crop year in 1951.

The main measures taken to control soil drifting were the choice of the right implements and the use of stubble. The cultivator was considered to be a useful implement in wind erosion control in that it tends to keep the trash on top as well as the soil surface lumpy and ridgy. Most of the farmers never burned stubble and thus assured themselves of adequate trash cover.

Water Erosion.- Only 28 farmers out of 328 reported water erosion on their land. One farmer reported sheet erosion, ten farmers reported rill erosion and 17 farmers reported gullies washed out on their farms. Only nine farmers attempted any water erosion control measures and eight of these used tillage measures rather than cultural measures.

Alkali Problems.- Alkali soils were a minor problem in the

survey area. Average acreage in alkali soils was two acres per farm in the loam soils area and four-tenths of an acre in the clay soils area.

Only 16 farmers employed some method of soil improvement. Four farmers spread manure and straw on alkali spots, three farmers grew sweet clover and grass, one used commercial fertilizer, four sowed oats or barley and the remaining four employed a combination of the above practices.

Crop Hazards

Weeds.- The most common annual weeds reported by the farmers in the survey area were Stinkweed, Wild Oats, Russian Thistle and Wild Mustard. The most common perennial weeds were Sow Thistle, Canada Thistle and Quack Grass. The proportion of farmers who reported these annual and perennial weeds in the loam and clay soils areas is indicated in Table 18.

Table 18.- The Most Common Annual and Perennial Weeds on Farms in the Farm Practices Survey Area, Saskatchewan, 1951

	Farms on loam soil	Farms on clay soil
	- per cent of farms -	
Annual Weeds		
Wild Mustard	15	87
Wild Oats	48	61
Stinkweed	51	21
Russian Thistle	17	33
Other	19	9
Perennial Weeds		
Sow Thistle	68	9
Canada Thistle	19	12
Quack Grass	18	2

In comparing the two areas, it was noticed that there were differences in the kind and extent of the weed hazard between the various groups of farms. Wild Mustard was considerably more extensive on the farms on clay soils. Sow Thistle was more of a problem in the loam soil area. Generally, the annual weeds were more common on the clay soils and the perennial weeds on the loam soil.

Plant Diseases.- In the loam soils area, three per cent of the farmers reported rust, six per cent smut and three per cent root rot. The proportion of farmers reporting disease was higher in the clay soils area. Ten per cent of the farmers in the clay soils reported rust, nine per cent smut and 14 per cent root rot. Damage from these plant diseases, however, was slight.

The main control of plant diseases was in the use of Formalin, Ceresan and Leytesan for smut. Nearly 75 per cent of the farmers in

CONTROL OF WEEDS, INSECTS AND PLANT DISEASES CAN MAKE THE CROP.

the loam soils area and over 85 per cent in the clay soils area tested the wheat seed grain for disease.

Insect Pests.- The most common insect pests in the two areas were wheat stem sawfly and grasshoppers. Wireworms and cutworms were more of a problem on the loam soils than on the clay soils. Eight farmers on clay soils reported aphids as one of the insect pests.

Table 18a.- Insect Pests on Farms in the Farm Practices Survey Area, Saskatchewan, 1951

Insect pests	Farms on loam soils	Farms on clay soil
	- per cent of farms -	
No insect pests	19	17
Wheat stem sawfly	45	58
Grasshoppers	49	34
Cutworms	26	8
Wireworms	21	6
Aphids	-	5

Forty-five per cent of the farmers in each group reported no insect control. Thirty-four per cent of the farmers on loam soils and 25 per cent on clay soils used spray as a control measure for grasshoppers. The control measures for wheat stem sawfly were early swathing and use of Rescue wheat. Twelve per cent of the farmers swathed early and three per cent used Rescue wheat on loam soils. On clay soils, 26 per cent of the farmers swathed early and four per cent used Rescue wheat. No special control measures were used to combat wireworms and cutworms.

Methods of Improvement

A large proportion of the farmers, when questioned on their plans for future improvements in farm organization and farm practices, indicated that they had no specific plans in mind. Eighty-eight out of 161 farmers on loam soils and 69 out of 167 farmers on clay soils indicated some plans for improvement of farm practices to be carried out in the near future. The distribution of farmers according to the methods of improvement of the various farm practices is summarized in Table 19.

Table 19.- Methods of Improvement of Farm Practices for Farms in the Farm Practices Survey Area, 1951

Farm Practices	Farms on loam soil	Farms on clay soil
	- per cent of farms -	
No plans for improvement	45	59
Equipment requirements	19	17
Use of fertilizer	20	5
Change of rotation	8	13
Use of weed spray	10	1
Change in type of crop and variety of seed	5	1
Timeliness	2	2
Handling of stubble and straw	-	2
Drainage and irrigation	-	2
Other	4	7

The most common improvement requirement was in the use of tillage equipment. This was in accordance with the general trend in the survey area from the use of the one-way, discer and duckfoot cultivator to the heavy-duty cultivator for summerfallow tillage. A preference for the two-year rotation rather than the usual three-year rotation was also indicated by a number of farmers in both groups.

Generally the need for improvement of farm practices was greater in the loam soils area. This was particularly evident with regard to the use of fertilizer and weed spray. A few farmers in both areas indicated the need of a change in type of crop and variety of seed, better timeliness, improved handling of stubble and straw and some provision for drainage and irrigation.

YIELDS AND PRACTICE CORRELATIONS

Differences in yields between farms may not be due to variations in soil productivity but rather a reflection on the crop production methods. This does not mean, however, that crops will produce abundantly on poor land by using the correct farm practices. But the best yields can be had on any land if the farmer uses timely, correct and careful farm practices from beginning to end of the season. Wrong equipment, untimely operations, little or no weed control, absence of erosion control, lack of suitable crop rotation and crops not adapted to the soil condition will soon lower the yields on the best of land.

This section of the study is an attempt to indicate some of the reasons for the discrepancies in yields between farms on the same soil. Unfortunately, the analysis of the relationship of yields to practices involved a number of limitations which made it difficult to determine the exact nature of the relationship.

The predominant limitation was the abnormal climatic conditions experienced in the fall seasons of 1950 and 1951. This gave an unusual variation in yields for reasons other than those related to practices. In 1950, the variations in yields between farms was due, in part, to the extent of frost damage. Again, the excessively wet fall of 1951 delayed harvesting and caused a reduction in yields. It was impossible to ascertain the extent to which the climatic factor influenced the yield differences. Thus, the analysis of the relationship of yields to practices was based on the assumption that the reduction in yields from frost and excessive rainfall was constant for all farms.

The close interrelation of some of the practices which influenced yields made it difficult to attribute differences in yields to any one of the practices. Hence, it was difficult to determine the net effect of any specific practice on yields. The relationship of any one of the practices and yields was, therefore, only a portion of the total relationship of the combined effect of all the practices and yields.

Average Wheat Yields

Yield Variability Between Soils.- Under dry farming conditions the heavier-textured soils can usually be expected to produce more than soils of lighter texture. That is, the clay soils of the area will yield more than the loams. Thus, a classification of farms according to soil type was necessary to eliminate any variation in yield due to differences

BUT IT'S NO USE IF ALL THIS INFORMATION IS NOT UNDERSTOOD.

in soil, before attempting to indicate any relationship between yield and practices.

The following table shows the wheat yield averages for the Regina heavy clay and the Weyburn loam soils for the years 1950 and 1951. The yield data used in this general presentation of soils is confined to the summerfallow wheat crop.

Table 20.- Average Yields of Summerfallow Wheat According to Soil Types in the Farm Practices Survey Area, 1951

Soil type	1950	1951	1950-51 average
	- bushels per acre -		
Loam	19.3	13.1	16.3
Clay	18.3	30.3	24.1

Yield Variability Between Farms.- The 1950 and 1951 wheat yields of the farms within the Regina heavy clay and the Weyburn loam soil groups were studied separately and the farms obtaining consistently low yields were segregated, as were the farms obtaining consistently high yields. Of the 83 farms that were segregated, 19 farms were consistently low yielders on the clay soils, 24 farms were consistently low yielders on the loam soils, 20 farms were consistently high yielders on the clay soils, and 20 farms were consistently high yielders on the loam soils.

Table 21.- Average Yields of Wheat of Consistently Low and High Yielding Farms According to Soil Type in the Farm Practices Survey Area, 1951

Soil type	1950		1951		1950-51 average	
	Low yielding	High yielding	Low yielding	High yielding	Low yielding	High yielding
Loam	11.9	28.1	8.2	17.8	10.0	23.0
Clay	9.7	27.2	24.8	36.1	17.3	31.7

The figures in Table 21 indicate the wheat yield averages for the groups of farms selected as having consistently high yields or consistently low yields for clay and loam soils. The difference in average yields between the low yielding and the high yielding groups of farms for the 1950-51 period averaged out at 13 bushels for the loam soil and 14.4 bushels for the clay soil. Part of the large difference in yields may have been due to soil and climatic factors. However, there was no evidence to indicate that these factors had any significant effect on the low or high yielding farms. The available data on farm practices tend to show that the above-mentioned yield difference was due mainly to differences in farm practices.

Yield Variability Within Farms.- It is common knowledge that yields on some fields within the farm unit are higher than on others. This is understandable since most of the farmers vary their practices somewhat on the different fields. The farmer may intentionally work a portion of his land differently on the basis of experimentation. Also, certain practices are not subject to complete control. For instance, the factor of timeliness will vary from field to field for each farming operation.

To eliminate the variability of yields between fields, the recorded data included average wheat yields for a portion of the farm unit where complete information on the practices associated with these yields was available.

Practice Comparisons

All farm practices were examined for their relationships with yields, but only those practices most clearly associated with wheat production were considered in detail. The practices that showed a definite relationship with yields in 1950 and 1951 were: (1) pre-seeding cultivation, (2) type of implement used for seeding, (3) depth of seeding, (4) use of fertilizer, (5) use of weed spray, (6) number of summerfallow operations, and (7) type of implement used for summerfallow operations. A number of other practices were studied but these were fairly evenly distributed between the low-yielding and high-yielding groups. There were, however, some indications that the effect of the more significant practices tended to obscure the association between yields and the less significant practices. Generally the higher yields were a result of a combination of favourable practices carried out by the farmers.

The high yielding groups included more farmers that had cultivated the land before seeding than farmers who had done no pre-seeding cultivation. The relationship appeared on both the clay and the loam soils for the 1950 summerfallow crop as well as for the 1951 summerfallow and 1951 stubble crop. The figures in Table 22 indicate that the practice of pre-seeding cultivation was more closely associated with yields on loam soils than on clay soils. This was attributed to the general practice of the farmers on the clay soil of preparing the seed bed and sowing the crop in one operation with discer.

Table 22.- Pre-seeding Cultivation on Consistently Low and High Yielding Farms in the Farm Practices Survey Area, 1951

Crop	Clay		Loam	
	Low yielding farms	High yielding farms	Low yielding farms	High yielding farms
	- per cent of farms practising pre-seeding cultivation -			
1950 summerfallow	16	35	58	90
1951 summerfallow	16	35	50	85
1951 stubble	17	29	30	39

Baled straw for livestock in the Weyburn loam soils area.

Spraying crop for weeds by aeroplane.

The town of Milestone and surrounding farm land in the Regina heavy clay soils area.

A considerably higher percentage of the farmers on the high than on the low yielding farms used the drill for seeding wheat. This relationship was especially significant on the farms on loam soil since the drill was more commonly used here. The farmers who used the discer for seeding were fairly evenly distributed between the high and low yielding farms. The use of one-way for seeding was least conducive to higher yields.

It was observed that the farmers who had used the drill for seeding had also employed the practice of pre-seeding cultivation. Thus, the data indicated that the higher yields were due to a combination of the use of pre-seeding cultivation and of the drill. It was impossible to ascertain which of the two interrelated practices was more closely associated with yields.

Table 23.- Implement Used for Seeding on Consistently Low and High Yielding Farms in the Farm Practices Survey Area, 1951

Crop	Clay		Loam	
	Low yielding farms	High yielding farms	Low yielding farms	High yielding farms
	- per cent of farms -			
1950 summerfallow				
Drill	16	30	50	85
One-way	42	20	38	15
Discer	42	50	12	0
1951 summerfallow				
Drill	16	35	50	85
One-way	42	20	42	10
Discer	42	45	8	5
1951 stubble				
Drill	17	29	30	44
One-way	39	24	52	56
Discer	44	47	18	0

The comparative analysis of the low yielding and the high yielding farms showed that commercial fertilizer was used on a larger proportion of the high yielding farms. It was also noted that more farmers on the clay than on the loam soils favoured the use of fertilizer. In 1950, there were 39 per cent more farmers using fertilizer in the high yielding clay soil group than in the low yielding clay soil group. On loam soil for the same year, there were 26 per cent more farmers using fertilizer on the high yielding farms than on the low yielding farms. Similarly in 1951, the difference in number of farmers using fertilizer between the high and low yielding farms was 89 per cent for the clay soil and 25 per cent for the loam soils. None of the farmers applied fertilizer on the stubble crop.

Table 24.- Use of Fertilizer on Consistently Low and High Yielding Farms in the Farm Practices Survey Area, 1951

Crop	Clay		Loam	
	Low yielding farms	High yielding farms	Low yielding farms	High yielding farms
	- per cent of farms using fertilizer -			
1950 summerfallow	16	55	4	30
1951 summerfallow	11	100	0	25
1951 stubble	0	0	0	0

Another significant factor that emerged from this study was that the farmers on high yielding farms were more aware of the value of controlling weed growth through the use of weed spray. This relationship was noticed on both the 1950 and 1951 summerfallow crops as well as on the 1951 stubble crop. More farmers on the clay soils sprayed weeds than those on the loam soils.

Table 25.- Use of Weed Spray on Consistently Low and High Yielding Farms in the Farm Practices Survey Area, 1951

Crop	Clay		Loam	
	Low yielding farms	High yielding farms	Low yielding farms	High yielding farms
	- per cent of farms using weed spray -			
1950 summerfallow	68	80	17	35
1951 summerfallow	21	60	12	25
1951 stubble	11	41	13	17

The farmers in the high-yielding group tended to have more operations on summerfallow. This relationship was particulary evident on those farms that had only two summerfallow operations. That is, more farms in the low yielding group had only two summerfallow operations.

Table 26.- Number of Summerfallow Operations on Consistently Low and High Yielding Farms in the Farm Practices Survey Area, 1951

	Clay		Loam	
	Low yielding farms	High yielding farms	Low yielding farms	High yielding farms
	- per cent of farms -			
Two operations	39	15	38	16
Three operations	50	75	42	32
Four operations	11	10	12	31
Five operations and over	0	0	8	21

PROPER TIMING OF OPERATIONS THROUGHOUT THE CROPPING YEAR RESULTS IN HIGHER PRODUCTION.

Information shows that the farmers on the high-yielding farms used the cultivator type of implement to a greater extent and the disc type of implement to a lesser extent than farmers on the low yielding farms. Forty per cent of the farmers in the low yielding group used the one-way disc, discer or disc harrow for all the summerfallow operations, whereas only ten per cent of the farmers with high yields did the same. More successful farmers employed a combination of disc and cultivator type of implements during the summerfallow year.

Table 27.- Relative Use of Disc and Cultivator Type Implements for Summerfallow Operations on Consistently Low and High Yielding Farms in the Farm Practices Survey Area, 1951.

Implement used	Clay		Loam	
	Low yielding farms	High yielding farms	Low yielding farms	High yielding farms
	- per cent of farms -			
All disc type	32	10	46	10
All cultivator type	5	0	4	15
Combinations of disc and cultivator type	63	90	50	75

The farmers who sowed more than 3½ inches deep on the clay soil tended to have lower yields. On loam soil, deep seeding did not appear to have any ill effects on yields.

This far, only those practices that were significantly related with yields have been discussed. A number of other practices were studied but the variations in these practices as carried out by the farmers produced no relationship with yields. These practices were fairly evenly distributed between high and low yielding groups, thus indicating no apparent correlation.

Assuming that all practices had some effect on yields, then the relationship between practices that were not related and yields was more a matter of relative significance than a lack of association. That is, the more significant practices tended to obscure the relation to yields of the less significant practices. Knowledge of the practices more closely related to higher yields is of value in that it may be useful as a guide to farmers who are attempting to improve those practices most likely to produce the best results.

Another reason for the lack of relationship between some of the practices and yields could be traced to lack of sufficient data to make a basis for comparisons. For instance, over 85 per cent of the farmers practised a three-year cropping rotation. This meant that the sample of farmers that followed the two or four-year type of crop rotation was too small to be used as a basis for comparison.

Similarly, Thatcher was the predominant variety of wheat sown in both the Regina heavy clay and Weyburn loam soil areas. Whether other varieties of wheat would have produced better yields is unknown as far as this study is concerned.

It was difficult to establish the relationship between the generation of seed grain used and yields. The frost damage to grain in 1950 forced many farmers to use undamaged seed grain from stocks held over from previous years. Consequently, the use of registered first, second or third generation of wheat seed grain did not appear to be favourably related to yields on the 1951 summerfallow and stubble crops. In the 1950 summerfallow crop, however, there was a definite relationship between good quality seed and yields.

The rate of seeding wheat for 85 per cent of the farmers in the area was 1½ to two bushels per acre. The sample of farmers varying from this general practice was too small to be used as a basis of comparison.

In regard to the timeliness of operations, it was found that the majority of the farms fell within a fairly narrow range of time periods. Perhaps, if a larger sample of farmers who were consistently late in their farm work had been available, then it might have been possible to establish some relationship between timeliness of operations and yields.

Fall tillage was another example of practice where the number of farms doing fall tillage was too small to be used as a basis of comparison. Only 15 per cent of the farmers had done fall tillage in 1950 and 1951. Other farmers who, under suitable climatic conditions, would have done some fall cultivation were unable to do so because of the wet and late seasons for these years.

It was noticed that the farms in the high yielding group had a larger number of significant practices per farm than the farms in the low yielding group. As mentioned previously, the practices that appeared to be significantly related with yields were: pre-seeding cultivation, use of drill, use of fertilizer, use of weed spray, three or more operations on summerfallow and use of cultivator on summerfallow. The 83 farms were studied separately for the purpose of examining the number of significant practices carried out on each farm.

The results as presented in Table 28 indicate the percentage of farms that had no significant practices and the percentage of farms having one to three and four to six significant practices on low and high yielding farms. Results are shown for both soil groups and for the 1950 and 1951 summerfallow crops.

Nearly all the farms that had no significant practices fell in the group designated as low yielding. Also, the majority of farms that carried out only one to three significant practices fell in the low yielding group. On the other hand, those farms with four to six significant practices were more commonly found in the high yielding group.

GOOD PRACTICES MAKE THE DIFFERENCE BETWEEN PROFIT AND LOSS TO THE PRODUCER.

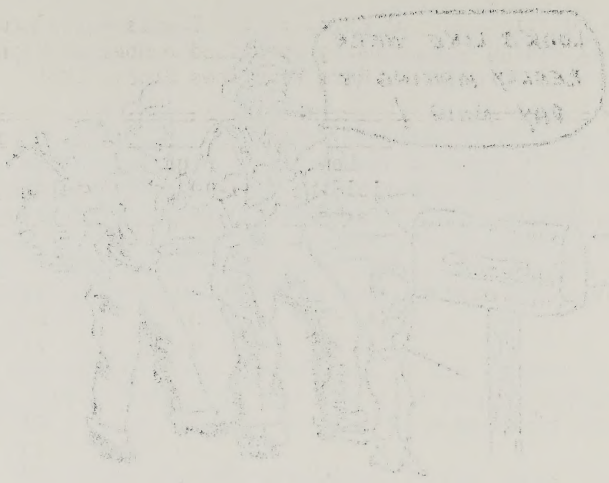


Table 28.- Distribution of Farms in the Consistently Low and Consistently High Yielding Groups Using Specified Number of Significant Practices, Farm Practices Study, 1951

Number of significant practices	Clay		Loam	
	Low yielding farms	High yielding farms	Low yielding farms	High yielding farms
1950 summerfallow crop				
No significant practices	11	0	17	9
1 to 3	68	35	62	40
4 to 6	21	65	21	60
1951 summerfallow crop				
No significant practices	16	5	21	0
1 to 3	74	40	50	20
4 to 6	10	55	29	80

In concluding this comparative phase of the study of practices and yields, it may be pointed out that differences in yields between farms on similar soils are shown to be largely due to differences in methods of producing crops. Also, high yields are not the results of the use of any one specific favourable practice but rather the combined effect of the application of a number of favourable practices. In other words, best yields are obtained when the managerial skill of the producer as reflected in all the farm practices is applied throughout the entire cropping year.